

SECTION 12.15
TUBULAR SIGN SUPPORT STRUCTURE

12.15.01--Description: This item shall consist of furnishing, fabricating, surface preparation, transporting, and erecting a tubular cantilever sign support or a tubular sign support structure, at the location shown on the plans or as directed by the Engineer. This item shall not include the anchor bolt assemblies, the actual sign panels, or concrete foundations.

12.15.02--Materials: The materials for this work shall conform to the following:

Structural tubing shall conform to the requirements of ASTM A 500, Grade B.

Steel plates shall conform to the requirements of ASTM A 36.

High strength bolts shall conform to ASTM A 325, Type 1. Nuts shall conform to either ASTM A 563, Grade DH or ASTM A 194, Grade 2H. Flat hardened washers shall conform to ASTM F 436. Bolts, nuts and washers shall be galvanized in conformance with ASTM B695, Class 50.

All stainless steel nuts, bolts, cap screws, plates and washers shall be nickel-stainless steel conforming to AISI 300 series.

Bonded bushings, couplings and square head plugs shall conform to the requirements of ASTM A 105.

Hot-dip galvanizing of the tubular members shall conform to the requirements of ASTM A 123.

Zinc Rich Field Primer for touch-up shall conform to the requirements of FS TT-P-641-Type I, and ASTM A780. The use of aerosol spray cans shall not be permitted.

Polyurethane sealant for filling the slotted holes in the base plate shall conform to FS TT-S-00227E, Type I or II (Class A or B).

Neoprene gasket material for the access openings shall conform to ASTM D1056, Grade 2A2 or 2A3. Other grades of neoprene approved by the Engineer may be used.

Bare copper wire shall conform to M.15.13.

Ground rods shall be 16 mm in diameter by 2.4 m long copper clad steel. The copper cladding shall be a minimum thickness of 3.3 mm. The ground clamp shall be an approved square head bolt type.

Non-shrink grout shall conform to M.03.01-12.

Certified Test Reports and Materials Certificates will be required in accordance with Article 1.06.07 for the hot dip galvanizing.

12.15.03--Construction Methods: Before starting fabrication, the Contractor shall determine the actual locations and elevations of the foundations.

Shop Drawings: Before fabricating any portion of the tubular sign support, the Contractor shall submit shop drawings for approval in accordance with Subarticle 1.05.02-3. These drawings shall include, but not be limited to, the following information:

- 1) The location and elevation of the foundation actually determined by the Contractor.
- 2) Complete details of the tubular sign support including dimensions of all components, camber, and material designations.

The tubular sign supports shall be completely shop fabricated except for bolting of connections and splices.

Fabrication of the tubular sign support shall conform to the requirements of Articles 6.03.03-5 and 6.

To prevent warping of the tubular members, base plates, connection plates and splice plates during welding of the plates, precautions such as the use of steel strongbacks bolted to the plates shall be utilized. Fabricated members which are warped and do not fit properly during the trial fit up shall be rejected.

After the tubular members have been completely fabricated, including cambering, but prior to galvanizing, all connections and splices shall be trial fitted and bolted in the fabricator's shop. The fabricated members may be rejected by the Engineer if the mating surfaces of the plates have a gap greater than 6.4 mm at any location prior to bolting. If after the shop bolting, the interface of the plates are not in contact at each bolt location, the fabricated members may be rejected by the Engineer. Bolts used for the trial shop fit-up shall not be reused in the final field assembly.

The horizontal member on the Tubular Sign Support Structure shall be checked for proper residual camber prior to it being galvanized. Horizontal members with splices shall be bolted together with temporary bolts for checking camber. With the horizontal member supported at its ends, the residual camber shall be measured at mid-span and the member shall be rejected if the camber does not fall within the following limits:

Minimum Residual Camber	Span/1000
Maximum Residual Camber	Span/500

Steel surface defects such as fins, slivers, tears, delaminations, burrs, sharp edges and other defects shall be ground down with the use of a power disc grinder or other tools approved by the Engineer, to afford as close to a continuous surface characteristic as possible. Defects that, in the opinion of the inspection personnel, are so large or deep that grinding may not rectify the defect, shall be referred to the Engineer for resolution.

After the posts and the horizontal members have been fabricated, welds ground smooth, flux and splatter removed, they shall be hot-dip galvanized in accordance with ASTM A 123, or A 386 as applicable.

Each lot of steel so treated shall bear a label clearly showing the name of the galvanizer, the ASTM specification used for the galvanizing and complete instructions for touch-up/repair of damaged material. Fabrications and materials shall be packed with sufficient dunnage and padding to protect finished surfaces.

Mating surfaces of the post and arm plates or splice and connection plates, just prior to assembly, shall be wire brushed to mark and score the zinc surface without appreciably removing any material.

Assembly of bolted connections and splices shall conform to the applicable requirements of Article 6.03.03-19, amended as follows:

The bolts shall be installed with the direct tension indicator under the bolt head. The nut shall be turned to tighten the bolt and reduce the gap in the indicators to less than 130 μm .

The bolts and direct tension indicators shall not be reused. If it becomes necessary to loosen a bolt previously tensioned, the bolt and direct tension indicator shall be discarded. Re-tightening previously tightened bolts, which may have been loosened by the tightening of adjacent bolts shall not be considered as reuse.

The posts shall be securely bolted to their bases and shall be plumb or slightly raked back from the roadway upon completion of erection.

All damaged areas of the galvanizing shall be properly prepared and touched-up. Damaged zinc shall be touche-up in accordance with ASTM A 780. Spray aerosol cans of zinc rich primer will not be permitted.

The void between the top of the concrete foundation and underside of the base plate shall be completely filled with non-shrink grout after the anchor bolt nuts have been tightened. The grout shall be mixed and placed in accordance with the instructions of the manufacturer of the grout.

The slots in the base plate at the anchor bolts shall be completely filled with polyurethane sealant.

The ground conductor shall be installed as shown on the plans.

12.15.04--Method of Measurement: This work will be measured for payment by the number of units of "Tubular Cantilever Sign Support," or "Tubular Sign Support Structure" installed and accepted.

Article 12.15.05--Basis of Payment: This work shall be paid for at the Contract unit price each for "Tubular Cantilever Sign Support" and "Tubular Sign Support Structure," complete in place, which price shall include all materials, equipment, labor, tools, and work incidental thereto.

Pay Item	Pay Unit
Tubular Sign Support Structure	EA.
Tubular Cantilever Sign Support	EA.